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| 10/517,808 | 07/28/2005 | Konrad Kapser | 4814/PCT | 8904 |

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| EXAMINER | |
|---|---|
| SHABMAN, MARK A | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/517,808 | KAPSER ET AL. | |
| | Examiner | Art Unit | |
| | Mark Shabman | 2809 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,2 and 8-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 8-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/9/04* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/9/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

Claim 12 is objected to because of the following informalities: the claim discloses a bi-axial monolithic acceleration sensor "comprising the following characteristic features:" then further goes on to state "the acceleration sensor (1) consists of two individual sensors (2a-d)". Thus the acceleration sensor as a whole is limited to two individual sensors, yet four are claimed. Examiner will examine the claim based on the assumption that two sensors are present. Appropriate correction is required.

### *Drawings*

The bi-axial monolithic acceleration sensor as claimed in claim 12, is not shown in the drawings. The claim states the acceleration sensor "consists of two individual sensors", thereby limiting the invention to include exactly two sensors. There are no drawings included which show this limitation of the current invention. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**Claims 1, 2, 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seidel US Patent 6,122,965 (hereinafter referred to as Seidel) in view of Boxenhorn US Patent 4,699,006 (hereinafter referred to as Boxenhorn).

Regarding **claim 1**, Seidel discloses a system for the measurement of acceleration in three axes by means of multiple sensors, each containing a seismic mass. Column 2 lines 19-24 describe the four "sensor masses" which are further described to be arranged along a "main sensitivity axis" in column 3 lines 1-5. The four masses are all arranged on a common substrate which as described in column 2 lines 1-5. Each seismic mass comprises a center of gravity $S_a$, $S_b$, $S_c$ and $S_d$, as described in column 2 lines 27-28 and seen in figure 1. Seidel further discloses in column 2 lines 47-50 that each sensor has a piezoresistor connected to a wheatstone bridge that measures the acceleration forces affecting the sensor. These forces result in a bending of the piezoresistor due to the movement of the mass when placed under an acceleration, thus reading on the "means for the measurement of the deflection of the seismic mass" as claimed. Figure 1 of Seidel shows each of the four sensors arranged "eccentrically relative to its center of gravity" and further shows how each of the sensors would rotate relative to the other individual sensors by 90°, 180°, or 270°". Seidel does not disclose the four seismic mass sensors as being "suspended on two torsion spring elements" as claimed.

Boxenhorn discloses a vibratory digital integrating accelerometer and shows in figure 7 an embodiment of an accelerometer which contains a sheet portion 107

consisting of a mass suspended by two torsional springs 108 as described in column 9 lines 49-56. It would have been obvious to one of ordinary skill in the art at the time of invention to replace the bending beam of Seidel with the two torsional springs of Boxenhorn allow for two support means on each side of the mass thus creating a smaller moment of inertia for the mass allowing lesser accelerations to be detected.

Regarding **claim 2**, figure 1 of Seidel shows an arrangement of four acceleration sensors in a rectangular pattern reading on the claim in its entirety.

Regarding **claim 12**, Seidel discloses a system for the measurement of acceleration in two axes by means of multiple sensors, each containing a seismic mass as seen in figure 4. Column 4 lines 26-40 describe the two "sensor masses" which are further described to be arranged along a "main sensitivity axis" in column 4 lines 48-50. The two masses are all arranged on a common substrate in column 4 lines 26-29 as claimed. Each seismic mass comprises a center of gravity $S_A$ and $S_B$, as described in column 4 lines 48-53 and seen in figure 4. Seidel further discloses in column 2 lines 47-50 that each sensor has a piezoresistor that measures the acceleration forces affecting the sensor. These forces result in a bending of the piezoresistor due to the movement of the mass when placed under an acceleration, thus reading on the "means for the measurement of the deflection of the seismic mass" as claimed. Figure 4 of Seidel shows each of the four sensors arranged "eccentrically relative to its center of gravity" and further shows how each of the sensors would rotate relative to the other individual sensors by 90°, 180°, or 270°". Figure 5 of Seidel shows the main sensitivity axes 22a

and 22b extending vertically to the substrate 26. Seidel does not disclose the four seismic mass sensors as being "suspended on two torsion spring elements" as claimed.

Boxenhorn discloses a vibratory digital integrating accelerometer and shows in figure 7 an embodiment of an accelerometer which contains a sheet portion 107 consisting of a mass suspended by two torsional springs 108 as described in column 9 lines 49-56. It would have been obvious to one of ordinary skill in the art at the time of invention to replace the bending beam of Seidel with the two torsional springs of Boxenhorn allow for two support means on each side of the mass thus creating a smaller moment of inertia for the mass allowing lesser accelerations to be detected.

**Claims 8 and 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seidel in view of Boxenhorn as applied to claim 1 and 12 above, and further in view of Simmons US Patent 6,469,909 B2 (hereinafter referred to as Simmons).

Regarding **claim** 8, Siedel in view of Boxenhorn disclose the claimed invention as a whole with the exception of the substrate arranged between a lower cover disk and an upper cover disk for sealing.

Simmons discloses a MEMS Package with Flexible Circuit Interconnect, and in the abstract states that packaging for a MEMS device can include a step of hermetically sealing the components by bonding an upper or lower cover to the package body. It would have been obvious to one of ordinary skill in the art at the time of invention to seal the accelerometer of the claimed invention in such a manner since sealing of MEMS devices was common practice and known in the art to help increase the

longevity of the delicate electrical components due to decreased interaction with outside substances.

Regarding **claim 13,** Siedel in view of Boxenhorn disclose the claimed invention as a whole with the exception of the substrate arranged between a lower cover disk and an upper cover disk for sealing.

Simmons discloses a MEMS Package with Flexible Circuit Interconnect, and in the abstract states that packaging for a MEMS device can include a step of hermetically sealing the components by bonding an upper or lower cover to the package body. It would have been obvious to one of ordinary skill in the art at the time of invention to seal the accelerometer of the claimed invention in such a manner since sealing of MEMS devices was common practice and known in the art to help increase the longevity of the delicate electrical components due to decreased interaction with outside substances.

**Claims 9-11 and 14-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seidel in view of Boxenhorn as applied to claim 1 and 12 above, and further in view of Flach US Patent 5,905,203 (hereinafter referred to as Flach).

Regarding **claim 9**, Seidel in view of Boxenhorn discloses the invention as a whole including a means for measuring the deflection of each seismic mass by means of piezoresistors. The method of using a differential capacitance measurement to determine the deflection however is not disclosed.

Flach describes a Micromechanical Acceleration Sensor. The sensor contains a rocker which moves in response to an applied acceleration and produces a signal of changing capacitance based on position of the rocker in relation to two electrodes 12' and 12" as described in column 3 lines 18-29. Lines 33-43 of column 3 further describe determining the acceleration of the system by measuring the change in capacitance of the two capacitors. It would have been obvious to one of ordinary skill in the art at the time of invention to substitute the measurement method of Flach for that of Siedel and Boxenhorn since capacitive circuits are able to exhibit greater accuracy characteristics over wide temperature ranges.

Regarding **claim 10**, figure 8 of Flach shows the two electrodes 12' and 12' isolated from one another and close to the torsion axis 29 as claimed. By inverting the figure, the two electrodes would thus be "structured on the upper cover disk" as claimed. Such an inversion may be made, as it would produce no unexpected results.

Regarding **claim 11**, figure 8 of Flach shows the two electrodes 12' and 12' arranged symmetrically to the torsion axis, thus reading on the claim in its entirety.

Regarding **claim 14**, Seidel in view of Boxenhorn discloses the invention as a whole including a means for measuring the deflection of each seismic mass by means of piezoresistors. The method of using a differential capacitance measurement to determine the deflection however is not disclosed.

Flach describes a Micromechanical Acceleration Sensor. The sensor contains a rocker which moves in response to an applied acceleration and produces a signal of changing capacitance based on position of the rocker in relation to two electrodes 12'

and 12" as described in column 3 lines 18-29. Lines 33-43 of column 3 further describe determining the acceleration of the system by measuring the change in capacitance of the two capacitors. It would have been obvious to one of ordinary skill in the art at the time of invention to substitute the measurement method of Flach for that of Siedel and Boxenhorn since capacitive circuits are able to exhibit greater accuracy characteristics over wide temperature ranges.

Regarding **claim 15**, figure 8 of Flach shows the two electrodes 12' and 12' isolated from one another and close to the torsion axis 29 as claimed. By inverting the figure, the two electrodes would thus be "structured on the upper cover disk" as claimed. Such an inversion may be made, as it would produce no unexpected results.

Regarding **claim 16**, figure 8 of Flach shows the two electrodes 12' and 12' arranged symmetrically to the torsion axis, thus reading on the claim in its entirety.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Shabman whose telephone number is (571) 270-3263. The examiner can normally be reached on M-F 7:30am - 5:00pm, EST (Alternating Fridays Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Pendleton can be reached on (571) 272-7527. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MS

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SUPERVISORY PATENT EXAMINER